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SUPPLEMENT to the "*Synopsis of the Extinct Batrachia and Reptilia of North America.*"

BY E. D. COPE.

(Read before the American Philosophical Society, March 3, 1871.)

BATRACHIA.

SAUROPLEURA REMEX, Cope.

Proc. Acad. Nat. Sci., Phila. 1868, p. 217. *O. amphiuminus*, Cope.
Trans. Am. Phil. Soc. 1869, 17 in parts.

A fine specimen of this species recently sent me by Prof. Newberry, from Linton, Ohio, includes the vertebral column from the hind limbs to the end of the caudal series. One of the former is preserved and exhibits slender digits and other characters like those already described in the *S. pectinata*. Having ascertained that the *Oestocephalus amphiuminus* possesses no anterior limbs, I regard my reference of these species to that genus as premature, and will allow them to remain in *Sauroplesura*, where I originally placed them.

OESTOCEPHALUS AMPHIUMINUS, Cope.

Trans. Amer. Phil. Soc. 1869, p. 17; l. c. p. ii.

The bones formerly regarded by me as referable to a rudimental fore limb in this genus, appear to be rather branchiyls, and indicate the existence of external branchiæ.

COLOSTEUS SCUTELLATUS, Newb.

Pygopterus scutellatus, Newberry, Proceed. Ac. Nat. Sci., Phil. 1856.
Colosteus crassiscutatus, Trans. Amer. Phil. Soc. 1869, 23.

The original description of this species by Prof. Newberry was overlooked, in preparing my account of it above quoted.

MOSASAURIDÆ.

LIODON SECTORIUS, Cope, sp. nov.

Established on a large part of the under and upper jaw, and other parts of the cranium with a vertebra, from the green sand of the upper bed of the Cretaceous of New Jersey.

The character which at once distinguishes this species from other *Liodons*, and especially from all the species of *Mosasaurus*, is the very compressed form of the crowns of the teeth, which approach nearer in this respect to those of *Diplomodon*, than any others that I have seen. The vertebra, a lumbar, has also subround articular faces, thus removing the species from close relationship to those with depressed vertebrae, of some of which the teeth are unknown.

In the present specimen crowns and pedestals of thirteen teeth are preserved. Those of the mandible are most numerous, and display the successional modification of form from before backwards visible in other species of the family. The anterior teeth are less compressed, and have

but one, an anterior, cutting edge, the posterior face being regularly convex. The inner face is much more convex than the outer, and the flatness of the latter is marked at the apex of the tooth by a short ridge which bounds it posteriorly. This is a trace of the bounding angle which extends to the basis of the crown in *Mosasaurus*. The anterior cutting edge is in profile convex; the posterior outline concave to near the tip. The cutting edge is acute, and beautifully ribbed on each side, but not properly denticulate. The surface of the tooth is not faceted, but the outer face exhibits the peculiarity of a longitudinal concavity, or shallow groove extending from the base to the middle of the crown. The enamel is polished, but under the microscope minutely and extensively striate ridged. This description is taken from the second or third from the anterior end of the maxillary bone. The third from the distal end of the dentary is very similar.

The crowns become rapidly more compressed as we pass backwards. From a broad oval section of two crown bases, we reach a flattened oval crown, with the cutting edge sharp behind as well as before, and minutely ribbed. The crown is not faceted, and is more convex interiorly than exteriorly. The exterior convexity is chiefly anterior; the posterior face is slightly concave from the open groove already described as present in the anterior teeth. In two posterior crowns, one still more elongate in section, the external concavity becomes flatter and includes a great part of the outer face. A tooth still more posterior presents the peculiarity of the species in the strongest light. The crown is still more compressed, directed backwards, and only .25 higher than wide antero-posteriorly at the base. The latter is a little over twice the transverse diameter just behind the middle. The surface presents the characters described in others. The outer concave surface is wide and shallow, and contributes to the attenuation of the posterior half of the tooth rather than the anterior, which is consequently thicker. The cutting edges are sharp, the anterior convex and retreating backwards to the rather obtuse apex; the posterior convex above, concave below.

The exposed parts of the dental pedestals are frustra of cones, neither swollen nor concave.

<i>Measurements.</i>	<i>M.</i>
Third superior maxillary length crown.....	.033
“ height crown and pedestal.....	.048
“ longitudinal diameter base crown.....	.02
“ transverse.....	.013
Sixth dentary, longitudinal.....	.024
“ “ transverse.....	.014
Eleventh dentary height crown.....	.034
“ height crown and pedestal.....	.0505
“ longitudinal diameter basis crown.....	.026
“ transverse.....	.014

The articular bone is perhaps .66 the size of that of *Mosasaurus deKayi*

and presents less powerful development of the interior ridge for the pterygoid muscle. The cotylus descends abruptly behind it. The *coronoid* bone exhibits the usual anterior fissure. The rolled front margin of the ascending portion is thickened. The superior surface of the anterior part of the *frontal bone*, is lumpy and with some shallow pits; the outer face of the articular is smooth. The *vertebra* preserved is a posterior lumbar, and is injured; the anterior articular face is nearly round. Its vertical diameter is M.058. Length of centrum M.058.

The forms of the teeth distinguish the *Liodon sectorius* from the species of *Mosasaurus*, and that of the vertebra, from such species as *Liodon perlatus*, Cope, and *L. dyspetor*, Cope. There remain to compare with it, *L. proriger*, Cope; *L. mitchillii*, Dekay; *L. laevis*, Owen; *L. congrops*, Cope; *L. ictericus*, Cope; and *L. mudgei*, Cope. In size it will only compare with the first two species, being from twice to four times as large as any of the remaining four. The flattened teeth distinguish it at once from *L. ictericus*, and the abrupt rising superior margin of the articular bone, from the *L. mudgei*, where the upper and lower margins are for some distance parallel. The less compressed vertebral centrum distinguishes it from *L. laevis*. From the two large species, dental characters separate it. Thus in *L. proriger* the teeth are less compressed, and are faceted, especially the anterior ones, with concave grooves separated by obtuse ribs. In *M. mitchillii* the teeth present more similarity, but are abundantly distinct. They are much less compressed, even where the posterior cutting edge is strongly developed, the external face is convex to the apex and without concave or flat facet; it is narrower at the base as compared with the height, and has an incurvature not seen in this *Liodon*. The enamel is smooth, and not striate under the glass.

This and the *L. mitchilli* are the largest Liodons of the Eastern cretaceous. I have recently obtained three anterior dorsal vertebrae and a tooth of the latter, from the lower bed of cretaceous green sand near Freehold, N. J. The vertebrae rival in size those of *Mosasaurus dekayi*, but are of a more elongate form. The articular extremities are cordiform and nearly round, the posterior with the smooth neck band just in front of its margin. In front of this, the surface is sharply striate, especially on the inferior aspect; the same appears on the bases of the diapophysis. The tooth is like one of those described by Leidy. (Cret. Rept. Pl. XI.)

The *Liodon sectorius* was obtained by Judson C. Gaskill, from the marl pits of the Pemberton Marl Co., at Birmingham, N. J., and liberally placed at my disposal by him.

ADOCIDÆ.

The species of this family display considerable differences in the nature of the sutures of the bones of the plastron. In the thickest species the sutures are fine and the processes very small. This is especially the case with *Adocus pectoralis*. In *A. beatus* which is thinner, the sutures are coarser, but without gomphosis; that between the hyo- and hyposternal elements looking as though a slight mobility existed in life, as I have

observed in a former article. In *A. syntheticus* the sutures are a little coarser, and in *A. agilis* a further increase is seen, but with but little gomphosis. In *A. pravus*, according to Leidy, there is a little gomphosis, but how much is not ascertainable from his figure and description. In *Homorophus insuetus*, a stouter turtle, the gomphosis is very strong, especially in the longitudinal sutures, where the teeth are long and stout. In *Zygoramma* this coarseness of gomphosis reaches a maximum, being strong in all the sutures of the two species, except the anterior mesosternal of

ZYGORAMMA MICROGLYPHA, Cope, sp. nov.

This large species is represented by the greater part of plastron and half of carapace, with four marginal bones, of an individual from the New Jersey cretaceous, of two and a half feet in length. Its discovery is interesting as enabling me to refer this genus to the *Adocidæ* without doubt, a point which the specimens of the original species, *Z. striatula*, Cope, left uncertain.* The episternal bone displays beautifully the wide intergular scutum separating the lateral reduced gulars. The postabdominal bone displays the swellings corresponding to the pubis and ischium. The pectoral dermal scuta advance medially on the posterior part of the mesosternal bone. These characters are those of *Adocus*. On the other hand there is not satisfactory indication of the intermarginal scuta, though they may exist, and the free marginal bones anterior to the bridge display the double articulation, by suture and gomphosis characteristic of *Zygoramma*. It might be here observed that it is possible that this structure will be found to exist in species at present referred to *Adocus*, *A. agilis*, for example, where the marginal bones are unknown.

This species is one of those in which the mesosternal is received in the very open emargination of the hyosternals, a character indicating the breadth of the former, and seen in *A. agilis* and *A. syntheticus*. The bones are relatively thin, the marginals light and gently recurved. The anterior lobe of the plastron is truncate, the straight anterior margin grooved lengthwise. The posterior lobe is regularly contracted, and rounded, and with thin edge. The xiphisternal and hyosternal of the right side have each an oblique sutural union with the hyposternal of the left. The mesosternal is broader than long, the posterior margin broadly truncate, the latero-posterior curved sigmoidally, the anterior regularly convex. The episternal is but moderately thickened. The parts of the hyposternals on the bridge are nearly in the plane of the rest of the plastron. The marginal bones near those of the bridge have a thickened shoulder above within, into which the slender costal processes are received: they thin out rapidly and are gently everted distally. More distal marginals are lighter and more everted.

The bones of the carapace include three vertebrals and numerous costals. The latter display very weak capitular processes, but in none are they entirely absent. Neither they nor the vertebrals are thickened. The

* Proceed. Amer. Philos. Soc., 1870, 559.

vertebrals are short coffin-shaped, concave or emarginate in front; a stout laminar neural-spine supports the vertebra below.

The sculpture of all the bones is a delicate impressed punctation, the impressions forming lines or delicate grooves in some places. These run obliquely across some of the costals and marginals, and sublongitudinally on the posterior lobe of the plastron. The corneous scuta have left distinct impressions. The marginals extended on to the costal bones at the place of the free marginal bones. The vertebrae were a little longer than wide, with bracket shaped lateral sutures, and openly emarginate below. The intergular plate was pentagonal, with straight sides, and broader than long. The gulars are short and not prolonged very far on the outer margin of the plastron. The pectorals are narrowed laterally, and present a convex median outline on the mesosternum. The abdomino-femoral suture crosses a little behind the middle of the hyposternal bone. The median longitudinal suture winds from side to side on the posterior lobe in the most erratic fashion, abnormally no doubt, and the suture for the anals is anterior, convex in front, sigmoid at the sides.

<i>Measurements.</i>	<i>M.</i>
Length of plastron (restored).....	0.457
“ from front to postabdominal suture.....	.34
“ “ to (right) hyposternal.....	.195
“ “ to hyosternal.....	.104
“ “ to mesosternal.....	.038
Width at mesosternal.....	.194
“ of “ .....	.095
“ at postabdominal suture.....	.22
Thickness of mesosternal behind.....	.0116
“ of hyposternal medially.....	.0158
Width of average costal at vert. scute suture.....	.055
Thickness of same.....	.011
Total length adjacent vertebral.....	.066
Greatest width.....	.036
Width do. at end.....	.022
Length of first free marginal from bridge.....	.0635
Width of do. ....	.10
Thickness proximally.....	.0175
“ of a free marginal proximally.....	.01
Width “ “ .....	.075
Length “ “ .....	.0548

The type specimen of this species is about twice the size of that of *Z. striatula*. It also differs in some respects which might be attributed to age, as the greater recurvature of the marginal bones and the greater extent or prolongation of the thickening on the inside of the marginals next the bridge. But there are others which appear to be specific. Thus there is very little evidence of cross-union of sternal elements in the *Z. striatula*, and the sculpture is twice as coarse and so much more marked.

The pegs of the costal gomphosis are absolutely twice as large, and relatively still larger. I therefore believe this specimen to represent another species. Besides the sutural characters, those of the intergular scuta separate this species from *Adocus beatus*. In the latter that scute is urceolate, and the gulars sickle-shaped, being produced backwards on the margins of the episternal or clavicular bones. In *A. syntheticus* the intergular is narrower, and convex behind, the mesosternum is angulate posteriorly, and the plastron much thicker. In *A. agilis* the plastron is nearly similar in thickness, but the mesosternum is angulate behind, and is narrower, and the sculpture very much coarser.

The *Z. microglypha* was found by my friend, Judson Gaskill, in the marl excavations under his direction, at Birmingham, N. J.

AGOMPHUS, Cope.

This name is proposed for a genus of *Testudinata* heretofore not recognized. It appears to belong to the *Emydidæ* so far as known, but to differ from them in lacking the articulation of costal and marginal bones by gomphosis, characteristic of the existing genera of the family. It does not appear to differ in any other point so far as known. The type species is *Agomphus turgidus*, Cope (*Emys* Trans. Amer. Phila., 1870, 127); others from the cretaceous of New Jersey are *A. firmus*, Leidy (l. c. 126) and *A. petrosus*, Cope, (l. c. 126).

(?) PROPLEURIDÆ, Cope.

Sillim. Amer. Journ. Sci. Arts, 1870, (L) 137-8.

CATAPLEURA PONDEROSA, Cope, spec. nov.

This turtle is represented by two posterior marginal bones, six costals, a hyposternal, scapula and procoracoid, and femur and humerus, all more or less fractured.

The marginals are the caudal, and adjoining one of the right side. They both present a suture for the pygal vertebral, and the lateral presents also a pit for articulation by gomphosis with the last costal bone. They are of heavier form than those of any other species of the group. The hyposternal has had no sutural union with the hyosternal unless exteriorly; this, if existing, has been slight. The shaft of the humerus is contracted and nearly cylindrical; the great trochanter of the femur is little elevated, and not continuous in the plane of the head, but separated from it by a depression.

The above characters express the generic relationships of this type. The gomphosis with the last lateral marginal, as well as the lack of union of the lateral elements of the sternum separates it from *Osteopygis*; their union is more extensive than in *Propleura sopita*. This would not prevent the generic unity of the two, were it not for the additional characters of a slender shafted humerus, and probably broad short mandible with long symphysis. In *P. sopita* the rami are slender, and the symphysis short. The characters are much like those of *Catapleura repanda*, and I arrange it with that species until better information compels a change.

The *caudal marginal* is strongly concave below, convex above, the margin little recurved. The anterior outline is convex medially, with straight continuations at right angles to each lateral suture. A portion of the edge is broken off. Lateral marginal strongly and openly emarginate, surface not convex as in the median. Both are massive as in *Agomphus firmus* and allies. The union with the pygal ceases behind the costal pit.

The *costals* are thick and considerably curved transversely to the vertebral axis, the rib heads are unusually large and prominent and subcylindric in section. The rib-ridge is more elevated and rounded in section than in any other species.

The *hyposternal* is from the left side. It exhibits the free articulation for the xiphisternals; the posterior margin is thinned out, while the anterior is more abruptly rounded, and without trace of hyosternal suture. The external face is distally rayed with narrow ridges. The common peduncle of the scapula and procoracoid is short and wide, the sutural face for the coracoid, subtriangular.

The bicipital ridge of the *humerus* is as usual at right angles to the head, and is thin and flat. The plane of the inner crest makes an open angle with the outer; its base is less distant from the shaft than that of the outer. The great trochanter diverges somewhat from the plane of the axis of the head of the *femur*. The latter overhangs the shaft behind; the latter is curved, and beyond the middle subquadrate. In this as in the humerus, one of the two crests is continued as a ridge along the shaft.

<i>Measurements.</i>	<i>M.</i>
Length caudal marginal.....	0.06
Width.....	.08
Thickness.....	.0017
Width second ? costal bone.....	.082
Thickness do. at centre.....	.013
Width hyposternal at middle.....	.064
Thickness do. near anterior margin.....	.012
Length free portion of a rib.....	.018
Diameter (long) head humerus.....	.037
“ “ shaft “.....	.015
“ “ head femur.....	.033
“ “ shaft “.....	.016
Width mandible at symphysis at right angles to margin..	.034
Thickness mandible at symphysis posteriorly.....	.011

Accompanying the above remains were those of a small chelydrine turtle, and of a *Taphrosphys*, and a portion of the mandible of a species allied to *Lytoloma augusta* and other species. Its size relates well to the other bones of the *Catapleura ponderosa*, and I suspect that it belongs to that species. It has the expanded form with slightly recurved alveolar margin, of this group; the masseter fossa is strongly marked; the dental

foramen opens almost superiorly; the posterior margin of the jaw is deeply grooved.

The *C. ponderosa* differs from *C. repanda* in its rounded instead of flattened rib-ridges on the inferior surface of the costal bone, and in the different proportions of the crests of the femur. The lesser trochanter in the latter is more robust, and less narrowed and prolonged as a ridge on the shaft. The proximal half of the shaft is straight; in *C. ponderosa* curved.

This species was discovered by John G. Miers, a gentleman who has already enriched palæontology with many interesting forms. From the upper bed of Cretaceous green sand at Hornerstown, New Jersey.

In the nomenclature of the elements of the plastron of the Testudinata, I will in future adopt in part that proposed by Parker (on the shoulder girdle Roy. Society, 1869), who has shown after Rathke that the posterior pieces do not belong to the sternum. The bones from front backwards should then be named, *clavicle* ("episternal"), *mesosternal*, *hyosternal*, *hyposternal*, and *postabdominal* ("xiphisternal").

CROCODILIA.

BOTTOSAURUS MACRORHYNCHUS, Harlan.

C. harlani, Meyer. *Bottosaurus harlani*, Agass., Leidy, Cope.

The present state of knowledge of this rare species and genus involve some confusion, and I propose here to set it to rights in a brief manner. This is rendered easy by the discovery of the almost complete skeleton of a nearly grown individual, in the upper bed of cretaceous green sand.

Following my predecessors, I regarded the *Crocodylus basitruncatus* of Owen as this species, in the synopsis Batr. Rept. N. Am., 1869, p. 65, but with expression of considerable doubt. At page 231 of the same work, I distinguished the species of Owen as a true *Holops*. As I had supposed the cervical vertebræ to present the characters of *Holops*, the assignation of the specimens on which this opinion was founded to a species of that genus, left an entire uncertainty as to their character in *Bottosaurus*. The discovery of a series of vertebræ as above mentioned, settles that their structure is not that of the other cretaceous genera, but that of the Tertiary and recent forms, *i. e.*, that the hypapophysis of the cervicals are produced and undivided to the axis. Deducting the erroneously supposed character, there remains one curious feature to distinguish this form from the recent *Alligator*. The fangs of the teeth posterior to the eleventh are not enclosed by the dentary bone, but are exposed to the inner face of the splenial. How far the latter protects them the nature of the specimen does not allow me to decide.

It remains to correct the specific relations of this crocodile. At page 230 of the above work, I described a new species of *Bottosaurus*, under the name of *B. tuberculatus*, establishing it on remains of cranium of one individual and those of the posterior parts of a skeleton of another. The anterior part, with jaws of the latter having fortunately been recovered

as above mentioned, and placed in my hands, I find that the animal belongs to the original *B. macrorhynchus*, and that the first jaw and teeth represent an individual of another species, which will bear the name of *B. tuberculatus*. It differs from the first named in the acute or conic form of the crowns of some of the teeth, and probably in the much smaller size.

In addition to the generic peculiarities already mentioned, this species exhibits a disparity between the lengths of the centra of the lumbar and cervical vertebræ, which is unusual; compare the measurements below with those given for the remainder of the same animal as above cited.

The hypapophysis of the dorsal vertebræ are long, with parallel sides, and oval in section. In that one where the capitular articular face is near the suture of the neural arch, the articular cup is entirely round, and its margin flared out regularly to the capitular surface. The neurapophyses are narrow, and the anterior zygapophyses directed very obliquely downwards.

The *cervicals* are not only shortened, but diminish very much in diameter anteriorly, and the cup continues round. The hypapophysis is very stout on the anterior, more compressed on the posterior vertebræ. The neurapophysial articular faces have the usual rugose anterior and radiate crested posterior areas, but are short and wide, and the anterior area has an oblique concavity extending across it outwards and anteriorly.

The posterior area is, however, the more deeply grooved, especially on the lumbar vertebræ.

The *rami of the mandible* are preserved nearly entire. The large external foramen between the dentary, angular, and articular bones, exists as also the smaller one on the inner face of the ramus. The rami are hollow and thin walled, though of very stout form. The anterior teeth extend along the outer margin of the dentary and then cross to the inner side, the teeth from the twelfth to the eighteenth or last being separated, the first by rudimental septa the latter by mere low ridges. Six of these teeth are exposed without osseous wall on the inner face, and that for the anterior tooth is probably incomplete. The whole length of the ramus is about twenty-eight and a half inches. It is elevated at the position of the tooth usually called the inferior canine; this may be made to appear like an external expansion by rotating the ramus outwards (see Leidy Cretaceous Rept. U. S., Tab. IV. fig. 20). There is another elevation at the seventh tooth behind this point, and a concave curve to the elevation of the articular bone. The angle of the jaw is prominent. The cutting edge is rather obtuse and delicately ridged transversely; the rest of the crown is rugose-striate.

Measurements.

M.

Length ramus mandible.....	0.780
Length series of last seven teeth.....	.160
Depth ramus at twelfth tooth (from front).....	.084
“ at external foramen.....	.145

<i>Measurements.</i>	<i>M.</i>
Length centrum anterior lumbar.....	.055
Diameter cup do. ....	.042
“ neurapophysis do.....	.043
“ “ dorsal.....	.027
“ cup of centrum “ .....	.035
Length base hypapophysis.....	.03
Length centrum median cervical.....	.051
Width cup “ “ .....	.037
Depth “ “ “ .....	.035
“ “ anterior “ .....	.029
Width “ “ “ .....	.032
“ between post. marg. parapophyses.....	.045
Depth of centrum to lower edge.....	.04

Bottosaurus macrorhynchus, Harl., was then a crocodilian with a body of the proportions of our alligator, but with larger legs, and relatively considerably larger head. The cranial bones, however, are much less massive, as though to reduce the weight which would prove inconvenient to a body of no larger size. The bones of the mandible are thin and enclose large pneumatic cavities; the teeth are hollow and with thin walls.

I am indebted to Judson C. Gaskill for the opportunity of examining this interesting fossil.

DINOSAURIA.

HADROSAURUS CAVATUS, Cope, sp. nov.

This species is indicated by remains derived from the upper green sand bed of the upper Cretaceous of New Jersey. They belong to an individual of the gigantic proportions characteristic of the four known species of the genus. It is smaller than *H. tripos* or *H. occidentalis*, and in a less degree smaller than the *H. foulkei*. The remains consist of four caudal vertebræ from the median part of the series, three of them exhibiting rudiments of the diapophyses. In two of them the neural arch remains, one with the spine, and the articular prominences for the chevron bones are nearly complete.

The first character which is observed in these vertebræ is their opisthocœlian articulation. The posterior concave face is marked by a more or less prominent elevated band descending from the end of the floor of the neural canal, and which is sometimes grooved medially. The convex extremity is swollen in the middle, most especially so at three points, and a groove or depressed band which has less than one fourth the width of the centrum, extends round the margin outside of it. The general form of the extremities is rounded hexagonal, the anterior a little depressed, the posterior a little compressed. The sides of the centra are quite concave. The chevron articular projections are quite prominent, terminating ante-

riorly in a low ridge which extends to near the anterior face. At the latter position chevron articular faces are either wanting or very little marked. The centra exhibit no lateral angulation; the third from the anterior has a trace in a longitudinal fulness above the middle of the side; the last, the same, below the middle of the side. The margins of the extremities are well flared. The neural canal is a little compressed and deeply excavated in the centrum. The surface of the centrum is only rugose at the base of the diapophysis. The general form viewed laterally is subquadrate, the anterior vertebra a little deeper than long, the posterior a little longer than deep.

<i>Measurements.</i>	<i>M.</i>
Length centrum of anterior.....	.066
Depth posterior face.....	.071
Width ".....	.084
" of both chevron processes.....	.05
" of neural canal.....	.023
Depth neural canal.....	.023
Length neurapophysis.....	.04
Third vertebra, depth posteriorly.....	.071
" depth posteriorly with chevron process.....	.078
Fourth vertebra, width centrum behind.....	.075
" depth ".....	.066
" " with chevron process.....	.074
Width neural canal.....	.02
" spine.....	.025
" neurapophysis.....	.034

The measurements of depth of centrum are made from the floor of the neural canal, not from the upper margin of the superior lateral projections of the articular faces.

As in *H. foulkei*, the neural spines have a small antero-posterior diameter, and the zygopophyses are little developed. The anterior are subacuminate and more or less joined together. As the neural spine is very oblique, the posterior zygapophyses are above a point behind the articular extremity of the centrum.

This species differs at once from the *H. tripos*, *H. foulkei* and *H. minor* in the opisthocœlian vertebræ, resembling in this respect the *H. occidentalis* (Thespesius, Leidy). The latter differs from *H. cavatus* in the development of the chevron articulation equally on both adjacent centra, instead of on the posterior extremity only. In *H. foulkei* and *H. tripos* this double junction of chevrons extends to the extremity of the caudal series, adding another important ground of difference between them and the *H. cavatus*. The single caudal vertebra of *H. occidentalis* known, is like that of the former species in this respect, but there is no certainty that the structure continues the same throughout the caudal series, and that the distal vertebræ may not be like those of *H. cavatus* in this re-

spect. It, however, further differs in the relatively more compressed or oval centrum, and much greater size. From *H. minor* the present reptile differs in the opisthocœlian vertebræ, the known caudals of the former having plane articular surfaces, and in the much larger size. It is not possible to compare similar parts of this species and the *Ornithotarsus immanis*, Cope, but the larger size and much lower stratigraphic horizon of the latter renders their identity very doubtful.

Should the genus *Thespesius* of Leidy turn out to be well established, the present species will enter it. I am not, however, entirely satisfied that the difference in the form of the articular faces of the caudal vertebræ is such as indicates generic difference. It was on this ground that I referred this form to *Hadrosaurus* (in Synopsis Extinct Batr. Rept. N. Amer., p. 98), and not from misapprehension of Leidy's definition of it, as the latter supposes (Proceed. Aca. Nat. Sci., 1870, p. 67).

The rather slight material above described is fortunately so characteristic as to enable us to establish satisfactorily the existence of another monster of the remarkable group of the Dinosauria; beings, whose appearance and structure have rivalled the strangest creations of the imagination, and shown again what every other page of the book of nature teaches, that reality is stranger than fiction.

On Two extinct forms of Physostomi of the Neotropical Region.

By E. D. COPE, A. M.

(Read before the American Philosophical Society, March 3, 1871.)

Fam. ELOPIDÆ.

PRYMNETES, Cope.

Dorsal fin above the anal with short basis and very elongate rays; the posterior ray free and longer than the others. Ventrals posterior. Vertebræ with deep lateral grooves, disproportionally numerous in the abdominal region, viz.: Abd. 49, caudal 18. Tail deeply bifurcated, its exterior or supporting rays, like those of the dorsal, ventral and pectoral, very stout and obliquely segmented. Head short, mouth (in the specimen) inferior; teeth simple, small. Scales with many concentric grooves and a few radii on the proximal portion. No lateral line discoverable.

The pertinence of this genus to the Elopidae is indicated in various ways. The general form is that of *Elops* and *Megalops*, and the normal and supernumerary ribs are quite as in the former. The interneural spines extending from the head to the dorsal fin, are quite like those of the same genus. It differs from both in the posterior position of dorsal fin, and relatively numerous abdominal vertebræ. From *Elops* it differs especially in the long posterior lash-like ray of the dorsal, and the deeply grooved vertebræ.

PRYMNETES LONGIVENTER, Cope, sp. nov.

Established on a very fine and nearly perfect specimen, preserved on a